

National Climatic Data Center

DATA DOCUMENTATION

FOR

DATASET 5811 (DSI-5811)

Monthly Global and Tropical Surface and  
Upper-Air Temperature Anomaly Data

February 24, 2006

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**1. Abstract:** These files contain monthly global and tropical temperature anomaly time series for the surface and several upper-air layers and pressure levels, from satellite and in situ observations, for the period 1958-2004, and covering a vertical range from the surface to the lower stratosphere. They were prepared for the U.S. Climate Change Science Program's (CCSP) Synthesis and Assessment Report 1.1 entitled "Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences" and available at [www.climate-science.gov](http://www.climate-science.gov). That report gives more details about the individual surface, radiosonde, satellite Microwave Sounding Unit, and reanalysis datasets that were used in the report, including information on how to access them and sources of additional documentation. The only changes made to those original datasets were (1) creation of global and tropical (20S-20N) means from the original gridded or zonal-mean datasets, (2) normalization of all temperature anomalies to a consistent base period (1979-1999), and (3) creation of vertically-weighted layer-mean anomalies for additional layers not available in the original data products. The main purpose of these datasets was to facilitate the analysis presented in the CCSP report. They are being made available as part of the publication of that report.

Each of the surface, radiosonde and MSU datasets has been used in previous peer-reviewed studies, has been quality controlled for gross errors, and has had adjustments in efforts to remove artificial time-varying biases. However, as discussed in much more detail in the CCSP report, it is likely that additional errors remain in these data. The reanalysis datasets are known to have uncorrected time-varying biases.

## **2. Element Names and Definitions:**

A FORTRAN statement can be written to read the ASCII files:  
FORMAT(F7.2,25(1X,F10.3))

### **a. Date (YEAR&MM)**

**DEFINITION:** Decimal version of the calendar year and month (MM), computed as  
 $\text{YEAR} + (\text{MM} - 0.5) / 12$

**MINIMUM:** 1948.04

**MAXIMUM:** 2004.96

**UNITS:** years

**SCALING FACTOR:** 1

**DOMAIN:** A general domain comprised of the numeric characters.

**POSITION IN RECORD:** 1-7

### **b. RATPAC, HadAT, UAH, RSS, VG, NOAA-Sfc, NASA-Sfc, UKMO-Sfc, ERA40, and NCEPNCAR**

**DEFINITION:** Monthly temperature anomaly for the following datasets, in order: (1) NOAA's Radiosonde Atmospheric Temperature Products for Assessing Climate based on radiosondes, (2) UK Met Office's Hadley Center Atmospheric Temperature dataset based on radiosondes, (3) University of Alabama at Huntsville Microwave Sounding Unit data, (4) Remote Sensing Systems Microwave Sounding Unit (MSU) data, (5) Vinnikov and Grody Microwave Sounding Unit data, (6) NOAA National Climatic Data Center surface data, including land and sea surface, (7) NASA Goddard Institute for Space Studies surface data, including land and seas surface, with 1200 km interpolation radius, (8) UK Met Office and Climatic Research Unit of the University of East Anglia data combined land

and sea surface data, version 2, (9) surface and upper-air temperature data from the European Center for Medium Range Weather Forecasting Reanalysis, and (10) surface and upper-air temperature data the National Centers for Environmental Prediction/National Center for Atmospheric Research reanalysis.

Note that the dataset names used in these files differ from those used in the report. They correspond as follows:

<u>Name in File</u>	<u>Name in Report</u>
RATPAC	RATPAC
HadAT	HadAT2
UAH	UAH
RSS	RSS
VG	U.Md.
NOAA-Sfc	NOAA
NASA-Sfc	GISS
UKMO-Sfc	HadCRUT2v
ERA40	European
NCEPNCAR	US

**MINIMUM:** -3.06

**MAXIMUM:** +4.19

**UNITS:** degrees K

**SCALING FACTOR:** 1

**DOMAIN:** A general domain comprised of the numeric characters. Missing = -99.999.

**POSITION IN RECORD:** 8-18, 19-29, 30-40, 41-51, 52-62, 63-73, 74-84, 85-95, 96-106, 107-117.

3. **Start Date:** 19580101

4. **Stop Date:** 20041231

5. **Coverage:**

For files whose name begins with GLOBEGLOBE, the coverage is global:

- a. Southernmost Latitude: 90S
- b. Northernmost Latitude: 90N
- c. Westernmost Longitude: 180W
- d. Easternmost Longitude: 180E

For files whose name begins with 20NSTROPIC, the coverage is the tropical belt defined as follows:

- a. Southernmost Latitude: 20S
- b. Northernmost Latitude: 20N
- c. Westernmost Longitude: 180W
- d. Easternmost Longitude: 180E

Data for different vertical layers and levels are in separate files, named as follows. Their names in the CCSP report are given in square brackets.

SurfaceLVL - surface data from the surface datasets, reanalysis datasets, and from RATPAC radiosonde data [Ts]

850-300hPa - tropospheric data for the 850 to 300 hPa layer, from radiosonde and reanalysis datasets only [T(850-300)]

300-100hPa - near-tropopause data for the 300 to 100 hPa layer, from radiosonde and reanalysis datasets only

0100-50hPa - stratospheric data for the 100 to 50 hPa layer, from radiosonde and reanalysis datasets only [T(100-50)]

MSU2LoTrop - lower tropospheric data derived from MSU channel 2, from UAH and RSS MSU data, and derived from radiosonde and reanalysis data through use of vertical weighting functions of pressure level data [T2LT]

MSU2MdTrop - MSU channel 2 (mainly tropospheric) data from UAH, RSS, and VG, and comparable data derived from radiosonde data and reanalyses through use of vertical weighting functions of pressure level data [T2]

MSU4LStrat - MSU channel 4 (mainly stratospheric) data from UAH and RSS, and comparable data derived from radiosonde data and reanalyses through use of vertical weighting functions of pressure level data [T4]

FuTroposph - a tropospheric layer obtained by combining the MSU2MdTrop and MSU4LStrat data according to the methods described by Fu et al. (2004) and Fu and Johannsen (2005), based on MSU, radiosonde, and reanalysis data [T\*G or T\*T for global or tropical datasets, respectively]

Sfc-2LTdif - difference between surface minus MSU2LoTrop (see above)

#### **6. How to Order Data:**

These data may be freely downloaded. Ask NCDC's Climate Services about costs of obtaining this dataset via other media.

Phone 828-271-4800  
Fax 828-271-4876  
e-mail [NCDC.Orders@noaa.gov](mailto:NCDC.Orders@noaa.gov)

#### **7. Archiving Data Center:**

National Climatic Data Center  
Federal Building  
151 Patton Avenue  
Asheville, NC 28801-5001  
Phone: (828) 271-4800  
Facsimile Telephone: 828-271-4876  
Electronic Mail Address: [ncdc.orders@noaa.gov](mailto:ncdc.orders@noaa.gov)

#### **8. Technical Contact:**

National Climatic Data Center  
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151 Patton Avenue  
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Phone: (828) 271-4800  
Facsimile Telephone: 828-271-4876  
Electronic Mail Address: [ncdc.info@noaa.gov](mailto:ncdc.info@noaa.gov)

#### **9. Known Uncorrected Problems:**

No information available at this time.

#### **10. Quality Statement:**

These datasets are global and tropical temperature time series and have undergone considerable quality control, adjustment, and analysis.

Each of the surface, radiosonde and MSU datasets is considered state-of-the-art global temperature data and has been used in previous peer-reviewed studies, has been quality controlled for gross errors, and has had adjustments in efforts to remove artificial time-varying biases. However, as discussed in much more detail in the CCSP report, because the original observations from which they were constructed were not designed for long-term climate monitoring, their long-term stability is not guaranteed and remaining time-varying biases may remain in some or all of the datasets. The reanalysis datasets are known to have time-varying biases and are therefore not reliable for trend analysis.

Disclaimer: While every effort has been made to ensure that these data are accurate and reliable within the limits of the current state of the art, NOAA cannot assume liability for any damages caused by any errors or omissions in the data, nor as a result of the failure of the data to function on a particular system. NOAA makes no warranty, expressed or implied, nor does the fact of distribution constitute such a warranty.

#### **11. Essential Companion Datasets:**

None

#### **12. References:**

- a. Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences. Karl, T.R., Hassol S.J., Miller, C.D., and Murray, W. L., editors, 2006. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research, Washington, DC. In draft.
- b. Fu, Q., C.M. Johanson, S.G. Warren, and D.J. Seidel, 2004: Contribution of stratospheric cooling to satellite-inferred tropospheric temperature trends, *Nature*, 429, 55-58: doi: 10.103/nature02524
- c. Fu, Q., and C.M. Johanson, 2005: [Satellite-derived vertical dependence of tropical tropospheric temperature trends](#). *Geophys. Res. Lett.* 32, L10703, doi: 10.1029/2004GL022266.